

April 3, 1884.

THE PRESIDENT in the Chair.

The Presents received were laid on the table, and thanks ordered for them.

The President, on the part of the Council, submitted to the meeting the following address of condolence to be presented to the Queen :—

We, Your Majesty's most dutiful and loyal subjects, the President, Council, and Fellows of the Royal Society of London for the Improvement of Natural Knowledge, desire humbly to offer to Your Majesty the sincere expression of our heartfelt grief at the great loss which Your Majesty and Her Royal Highness the Duchess of Albany and the nation at large have sustained in the decease of His Royal Highness the Duke of Albany.

That a career so full of promise, and one which seemed likely to aid in fostering the interests both of literature and science, should have been so suddenly cut short, only serves to deepen our sorrow.

That it may please Divine Providence to support Your Majesty and the Royal Family in this heavy trial is the earnest wish and prayer of Your Majesty's loyal and devoted subjects,

THE PRESIDENT, COUNCIL, AND FELLOWS OF THE
ROYAL SOCIETY OF LONDON.

On the motion of General Walker, seconded by Sir James Cockle, it was resolved: That the Fellows do most cordially concur in the address now read from the Chair.

The following Papers were read :—

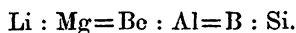
- I. "Remarks on the Atomic Weight of Beryllium." By W. N. HARTLEY, F.R.S.E., &c., Professor of Chemistry, Royal College of Science, Dublin. Communicated by Professor G. G. STOKES, D.C.L., Sec. R.S. Received March 19, 1884.

In a reply to a note by Professor Emerson Reynolds "On the Atomic Weight of Glucinum or Beryllium," presented to the Royal Society by Dr. Frankland on June 7th, 1883, Dr. Humpidge has made some critical observations concerning evidence which I adduced in favour

of the value 9 or 9.2. I did not consider that these remarks called for notice at the time, as they were beside the question immediately under discussion, namely, the experimental determination of the atomic heat of the metal, but from the fact that they have been abstracted for various journals, and that greater prominence has been given to them than was perhaps originally intended by the author, I beg to be allowed to comment upon them, as my opinions have been entirely misrepresented. Dr. Humpidge states in allusion to me: "This chemist concludes from his experiments that glucinum is a dyad metal, and that its homologues are calcium, strontium, and barium, elements with which it has not the slightest analogy." From this sentence it appears probable that Dr. Humpidge was not fully acquainted with the nature of the evidence advanced, which, however, might be excusable, since though the two papers in which it was contained were read at the meetings of the Chemical Society, that "On Homologous Spectra" on March 15th, and that "On the Spectrum of Beryllium" on April 19th, they were not published in the Journal in time for him to have consulted them.*

The statement quoted above is precisely my argument. "The spectrum of beryllium exhibits no marked analogy with the calcium, the magnesium, or the aluminium spectra, all of which are members of well-defined homologous series."

"There is nothing similar to the boron, the silicon, or carbon spectrum, nor to those of scandium, yttrium, or cerium. The spectrum of lithium is the one most allied to that of beryllium in the number, the relative positions, and intensity of the lines. The question, however, whether beryllium is a dyad, and the first member of the series magnesium, zinc, cadmium, is complicated, since it would probably present a spectrum of a different character to the succeeding homologues, in accordance with the following equation, which follows from the periodic law and holds good for the chemical properties of compounds:"—



"The relation of the spectrum of lithium to that of magnesium is obscure, that of boron to silicon less so, consequently we might expect that the relation of the beryllium spectrum to that of aluminium would not be well defined."

It is further remarked by Dr. Humpidge: "And it seems strange that Professor Hartley should consider some slight spectroscopic resemblance between glucinum and the metals of the alkaline earths

* The latter paper, which appeared first, was published in the June number of the "Journal of the Chemical Society," which reached me through the post on June 7th, its date of issue was therefore scarcely likely to be earlier than the 5th. The paper "On Homologous Spectra" was delayed until September.

to outbalance all the weighty chemical and physical differences between them."

The nature of the evidence derived from the spectroscope is here quite misrepresented; probably it was not well understood because of its novelty.

I have found that the spectra of magnesium, zinc, and cadmium are the result of three series of harmonic vibrations with similar intervals, the fundamental vibrations of which differ only in pitch. I have made some similar observations with regard to copper, silver, and mercury, aluminium, indium, and thallium, calcium, strontium, and barium, though maps of some of these spectra have not yet been published. I believe that in series of elements such as these, which exhibit gradational differences in properties and in the properties of their compounds, and approximately equal numerical differences in their atomic weights, we are dealing with the same kind of matter in different states of condensation, or in other words, with matter having similarly constituted molecules, the vibrations of which are in the same direction and at similar intervals but with different velocities.

If we attempt to classify beryllium in accordance with the views of Nilson and Pettersson, the elements scandium and yttrium, with atomic weights 44 and 89 respectively, must yield spectra characteristic of the series of which aluminium is the first member, but it is not possible to find a place for beryllium in this group, nor in those to which cerium, lanthanum, and didymium belong; it is, in fact, by a process of exclusion first and selection afterwards that the element falls into the dyad series.

In the position which I assign to beryllium, we can account for it being related, through the properties of its compounds, to magnesium and zinc on the one hand, and to aluminium on the other.

If there is one consideration of greater importance than another which should lead to the determination of the position of an element in a series, it is the mode of vibration of the molecule, and of that we have evidence in the spectrum. When the element is one with a low atomic weight there is no difficulty in interpreting such evidence.

II. "On the Heating Effects of Electric Currents." By WILLIAM HENRY PREECE, F.R.S. Received March 19, 1884.

The production of heat in electrical conductors due to the transference of electricity through them has become a matter of very great practical importance. A knowledge of the variation of the law, due to the dimensions and character of the conductor, is essential for lightning protectors and for the leads of electric lights.